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1. (Previously Amended) Seed of maize Inbred line designated PH581, representative seed of said line having been deposited under ATCC Accession No. PTA-4432.

2. (Original) A maize plant, or parts thereof, produced by growing the seed of claim 1.

3. (Cancelled)

4. (Original) A tissue culture of regenerable cells from the plant of claim 2.

5. (Previously Amended) A tissue culture according to claim 4, cells or protoplasts of the tissue culture being from a tissue selected from the group consisting of leaves, pollen, embryos, roots, root tips, anthers, silks, flowers, kernels, ears, cobs, husks, and stalks.

6. (Previously Amended) A maize plant regenerated from the tissue culture of claim 4, capable of expressing all the morphological and physiological characteristics of inbred line PH581, representative seed of which have been deposited under ATCC Accession No. PTA-4432.

7. (Original) A method for producing a first generation (F₁) hybrid maize seed comprising crossing the plant of claim 2 with a different inbred parent maize plant and harvesting the resultant first generation (F₁) hybrid maize seed.

8. (Original) The method of claim 7 wherein the inbred maize plant of claim 2 is the female or male parent.

9. (Original) An F₁ hybrid seed produced by crossing the inbred maize plant according to claim 2 with another, different maize plant.

10. (Original) An F₁ hybrid plant, or parts thereof, grown from the seed of claim 9.

11. (Cancelled)

12. (Cancelled)

13. (Cancelled)

14. (Cancelled)

15. (Original) A method for developing a maize plant in a maize plant breeding program using plant breeding techniques, which include employing a maize plant, or its parts, as a source of plant breeding material, comprising:

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obtaining the maize plant, or its parts, of claim 2 as a source of said breeding material.

16. (Previously Amended) The method of claim 15 wherein plant breeding techniques are selected from the group consisting of: recurrent selection, backcrossing, pedigree breeding, restriction fragment length polymorphism enhanced selection, genetic marker enhanced selection, and transformation.

17. (Cancelled)

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Previously Amended) A maize plant, or parts thereof, having all the physiological and morphological characteristics of inbred line PH581, representative seed of said line having been deposited under ATCC accession No. PTA-4432

22. (Cancelled) ~~The maize plant of claim 21 further comprising a genetic factor conferring male sterility.~~

23. (Original) A tissue culture of regenerable cells from the plant of claim 21.

24. (Previously Amended) A tissue culture according to claim 23, cells or protoplasts of the tissue culture being from a tissue selected from the group consisting of leaves, pollen, embryos, roots, root tips, anthers, silks, flowers, kernels, ears, cobs, husks, and stalks.

25. (Previously Amended) A maize plant regenerated from the tissue culture of claim 23, capable of expressing all the morphological and physiological characteristics of inbred line PH581, representative seed of which have been deposited under ATCC Accession No. PTA-4432.

26. (Original) A method for producing a first generation (F₁) hybrid maize seed comprising crossing the plant of claim 21 with a different inbred parent maize plant and harvesting the resultant first generation (F₁) hybrid maize seed.

27. (Original) The method of claim 26 wherein the inbred maize plant of claim 21 is the female or male parent.

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28. (Original) An F₁ hybrid seed produced by crossing the inbred maize plant according to claim 21 with another, different maize plant.

29. (Original) An F₁ hybrid plant, or parts thereof, grown from the seed of claim 28.

30. (Cancelled) /

31. (Cancelled) /

32. (Cancelled) /

33. (Previously Cancelled)

34. (Cancelled) /

35. (Cancelled) /

36. (Cancelled) /

37. (Currently Amended) A process for producing inbred PH581, representative seed of which have been deposited under ATCC Accession No. PTA-4432, comprising:

(a) planting a collection of seed comprising seed of a hybrid, one of whose parents is inbred PH581 said collection also comprising seed of said inbred;

(b) growing plants from said collection of seed;

(c) identifying said inbred PH581 plant[s];

(d) selecting said inbred PH581 plant; and

(e) [controlling pollination in a manner which preserves the homozygosity of] selfing or sibbing said inbred PH581 plant.

38. (Currently Amended) The process of claim 37 wherein step (c) comprises identifying a plant[s] with decreased vigor.

39. (Currently Amended) The process of claim 37 wherein step (c) comprises identifying [seeds or plants] a plant or seed with a homozygous genotype.

40. (Currently Amended) A method for producing a first generation PH581-derived hybrid maize plant, comprising:

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(a) crossing inbred maize line PH581, representative seed of said line having been deposited under ATCC Accession No. PTA-4432, with a second maize plant to yield progeny maize seed;

(b) growing said progeny maize seed, under plant growth conditions, to yield said first generation PH581-derived hybrid maize plant.

41. (Currently Amended) [A] The first generation PH581-derived hybrid maize plant, or parts thereof, produced by the method of claim 40.

42. (Currently Amended) The method of claim 40, further comprising:

(c) [crossing] selfing or sibbing said first generation PH581-derived hybrid maize plant [with itself] to yield additional PH581-derived progeny maize seed;

(d) growing said progeny maize seed of step (c) under plant growth conditions, to yield additional PH581-derived maize plants;

(e) repeating the [crossing] selfing or sibbing and growing steps of (c) and (d) for successive filial generations to generate further PH581-derived maize plants.

43. (Currently Amended) The further PH581-derived maize plants, or parts thereof, produced by the method of claim 42 wherein said further PH581-derived maize plants have at least 50% genetic contribution from inbred maize line PH581.

44. (Cancelled) /

45. (Previously Cancelled)

46. (Previously Cancelled)

47. (Cancelled) /

48. (Cancelled) /

49. (Cancelled) /

50. (New) A method of developing a backcross conversion PH581 maize plant wherein an inbred maize plant PH581 is crossed to a second maize plant, wherein a trait is backcrossed into said inbred maize plant PH581, and wherein said inbred maize plant PH581 is a recurrent parent.

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51. (New) The backcross conversion PH581 maize plant of claim 50 wherein the trait backcrossed into said inbred maize plant PH581 confers a trait from a group consisting of herbicide resistance, insect resistance, disease resistance, male sterility, and waxy starch; and wherein inbred maize plant PH581 has been used as a recurrent parent at least two times.

52. (New) A method of developing a first generation hybrid maize plant comprising crossing the backcross conversion PH581 maize plant of claim 51 with a second maize plant.

53. (New) The first generation hybrid maize plant developed by the method of claim 52.

54. (New) A method of developing a transgenic PH581 maize plant wherein inbred maize plant PH581 is transformed with a transgene.

55. (New) The transgenic PH581 maize plant of claim 54 wherein said transgene confers a trait from the group consisting of insect resistance, herbicide resistance, disease resistance, and male sterility.

56. (New) A method of developing a first generation hybrid plant comprising crossing the transgenic PH581 maize plant of claim 55 to a second maize plant.

57. (New) The first generation hybrid plant produced by the method of claim 56.